Synthesis

R&D Digest of Universiti Putra Malaysia

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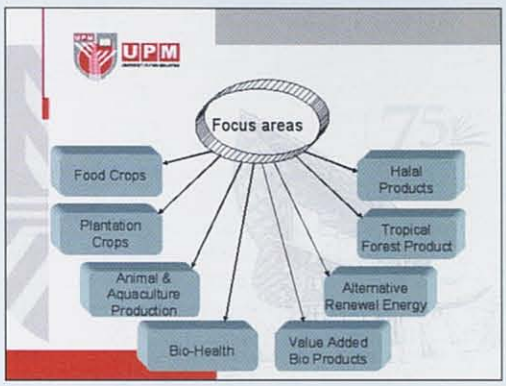
Pushing Research to a New Level —

Rationalisation Exercise: Why do we form Research Institutes in the University?

"The government has identified UPM as one of the Research Universities in the country,... we believe UPM has met the qualification benchmark",— Deputy Vice-Chancellor (Research & Innovation), Professor Dr. Abu Bakar Salleh

The government has identified UPM as one of the Research Universities in the country. Although the result of the validation process has not been announced, we believe UPM has met the qualification benchmark. This status is not achieved overnight, but the platform has been laid and the agenda has been pursued over the last 75 years. Being accorded the Research University (RU) status means, we have to reassess the way we do and manage R&D. Having achieved the RU status, it is essential for us to retain the status, but at the same time, raise the level of excellence, so that the expectation of our stakeholders can really be met.



In 1996, UPM established the Institute of Bioscience and subsequently a number of new institutes, academies and centres were formed. In response to the national expectation that UPM becomes the Centre of Agricultural Education, 12 initiatives were proposed and approved by the Malaysian Ministry of Higher Education. Subsequently, the number of institutes/academies/centres was raised to 18. As per the government initiatives to identify the RU universities, certain R&D production and strategies were set. It is thus essential for us to look at our plans and strategies to achieve our objectives. To this end, UPM needs to revaluate the way it organizes and manages its R&D. Based on the two Strategic Plan Review workshops, 8 R&D focus areas were identified.

■ *Turn to Page Three*

Mesocarp-Specific Promoter for Oil Palm Genetic Modification

Award Winner

Siti Nor Akmar Abdullah, Zubaidah Ramli and Mohamad Arif Manaf

Genetic engineering provides avenues for diversification to increase the economic value of palm oil. Production of speciality oils for industrial applications will be a very attractive proposition for the oil palm, since it is a very productive oil crop. This is considered a useful strategy to maximize income in the midst of problems of labour shortage, high labour cost and lack of arable land for expansion.

The success of any genetic engineering efforts relies on the availability of the following:

i) Genes to produce the desired traits;
ii) Regulatory sequence or promoter for controlling expression of introduced genes;
iii) Reliable transformation technique;
iv) Plant regeneration system.

■ *Turn to Page Eight*

Editorial

Editorial

Our research partnership through commercialization and patenting will bring together our common aspirations, distinctive talents, and ceaseless quest for excellence…

Universiti Putra Malaysia (UPM) is organizing the 2006 Inventions, Research and Innovations Exposition (PRPI 2006) between the 22nd till 24th on August 2006. The event is organized by the Research Management Centre (RMC) annually. This year PRPI 2006 will be held at the Sultan Salahuddin Abdul Aziz Shah Arts and Cultural Center or commonly known as the UPM Great Hall. UPM researchers are encouraged to participate to meet the following expo objectives;

1. To exhibit R&D achievements in various academic disciplines;
2. To identify R&D products that have the potential for commercialisation;
3. To give due recognition to successful R&D activities by UPM researchers;
4. To provide encouragement, support and platform for new researchers to exhibit their products thus ensuring continuity of research excellence in UPM;
5. To prepare and evaluate R&D products suitable for national and international expositions; and
6. To further enhance the R&D, invention and innovation culture among the university staff and students.

In order to promote R&D outputs and outcome, the university has been organizing several exhibition and special events on R&D during the last 10 years. It organised the first exhibition and seminar; *Harnessing for Industry Advantage* in 1997, followed by the UPM Innovation and Design Exhibition in 1999, 2000, 2001, 2002 and 2003. In 2005, the University organised PRPI 2005. It was opened to the UPM academia, the public as well as the industries to establish network between our researchers, technologies and industries.

Last year, all 23 PTJs in UPM involving 920 researchers took part in PRPI 2005. Four hundred and eighty medals comprising 48 gold medals, 175 silver, and 253 bronze medals were won. Apart from the success of this in-house exhibition, UPM researchers then moved up a step further at the national level, i.e. I-TEX 2005, Expo R&D IPTA 2005 before qualifying for the prestigious international competitions such as Geneva-Palexpo, INPEX 2005 (USA), BIS 2005 (Britain) and EUREKA 2005 (Belgium), etc.

It is hoped that the synergies arising from such R&D exhibitions will energize current activities towards new patents and commercialized products as well as spur further breakthroughs and innovations in the field and help our scientists to continue to flourish as well as contribute to processes and products that will improve the quality of our lives.

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Spotlight

Towards R&D Commercialisation!

Catalyst for innovation & wealth creation…..

Universiti Putra Malaysia (UPM) has a vital role in Malaysia's development into a knowledge and innovation driven economy. It can be a catalyst for innovation and wealth creation in an increasingly borderless world where the creation, dissemination and application of knowledge have become a global enterprise.

In rising to this challenge, UPM actively pursues a course of integrating its core competence in education and research with an entrepreneurial role. To infuse a spirit of enterprise in all our endeavours, the University has reformed 6 R&D clusters. The clusters also aim to promote entrepreneurial activities and initiatives by providing entrepreneurial support services, fostering industry collaboration, and facilitating greater commercialisation of ideas.

To move forward, UPM seeks to build synergistic partnerships with knowledge organisations, regionally and globally, to transform the university into a connected knowledge community of social and professional networks linked by shared interests.

Researchers, industrial and business entrepreneurs are invited to explore opportunities for collaboration available in UPM, and be our partner as we build synergies between education, research and entrepreneurship. Please refer to the UPM Research Directory (Published in two parts in 2005), Part 1— Products, Services & Expertise, and Part 2— Staff Profile: Faces of Innovation *(Editors: Muhamad Awang, Nayan Deep S. Kanwal, Mohd. Shahwahid Othman, Sidek Hj. Ab. Aziz and Zulkifli Idrus; ISSN.1675-7823)* published by Research Management Centre (RMC), UPM. This directory is a showcase of research products, discoveries, expertise and latest technologies developed by UPM researchers. It is categorized into ten research fields.

UPM therefore seeks to actively participate in new adventures of ideas, experiment with innovative methods, and take intellectual initiatives to further discover and expand the frontiers of knowledge.

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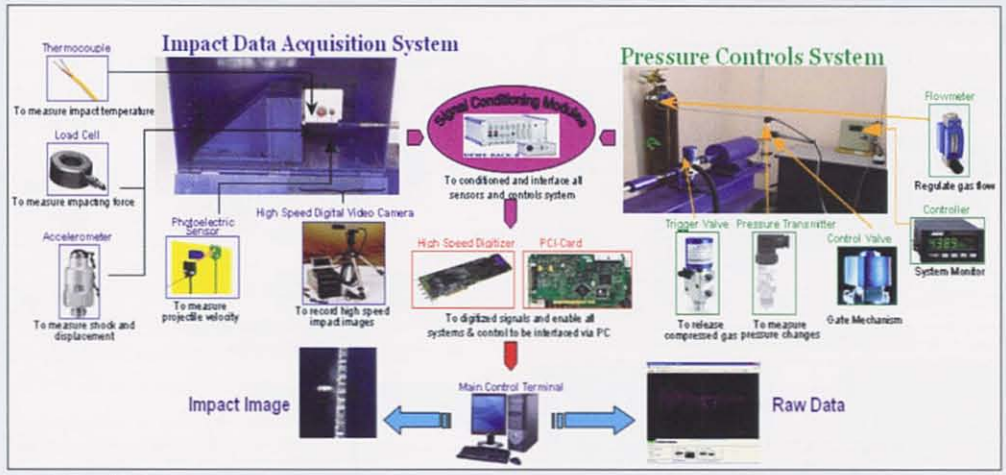
BANG SYSTEMS™ -

Design and Commissioning of UPM Ballistic Automated Network Gun Systems for Ballistic Studies

A.M.S. Hamouda, Risby M.S., Amjad H., Khairul A.R, S.V. Wong, and E. Mahdi

Award Winner

Hypervelocity related impact studies have received great interest in most developed countries due to its important in strategic defense, the search for new propulsions method and materials, and ballistic research. The behavior of materials under high pressure, stress and strain plays an important role in penetration mechanics and shock physics which require efficient accelerators and sophisticated data acquisition system to identity key parameters of this field of research. The most appropriate choice of high speed accelerator in term of cost, safety and maintenance are light gas guns. It is also the only accelerators capable of firing projectiles with complex shapes, different materials and weight at velocities up to 10 km/s.



Layout of the BANG system

The UPM Ballistic Research Group has taken the challenge to build the first in Malaysia, a laboratory scale ballistic testing facility known as Ballistic Automated Network Gun Systems (BANG-SYSTEMS-™). It consists of three sub systems; a compressed gas gun, high velocity data acquisition (HIVAC) system, and remote online monitoring and testing system (REMOTE). The gun has the capacity to launch a projectile with muzzle velocity (i.e. projectile discharge) of 1 km/s at a reservoir tank pressure 150 bar. Higher velocity is possible if the lighter projectile and a higher reservoir pressure were to be used.

HIVAC System was developed to enhance the UPM Gas Gun capabilities in the form of pressure controls system and impact data acquisition system using a virtual instrumentation software LabVIEW. It is a combination of multiple sub programs for synchronization; the functions of all sensor, gauges and controllers available in the system. The UPM Ballistic Research Group has also taken the initiative to utilize the Information and Communication Technology into its ballistic testing facility. A REMOTE System was developed to enable users to monitor and control the UPM Gas Gun and HIVAC system via the internet. Remote users can also monitor activities at research location and interact with on-site personnel. BANG Systems-™ with Online Ballistic testing operations is first of its kind in the region. The system provides more comprehensive details of ballistic impact data and is more flexible and cheaper than the actual field testing.

SILVER – *Biotechnology Asia 2005 Innovation Awards.*

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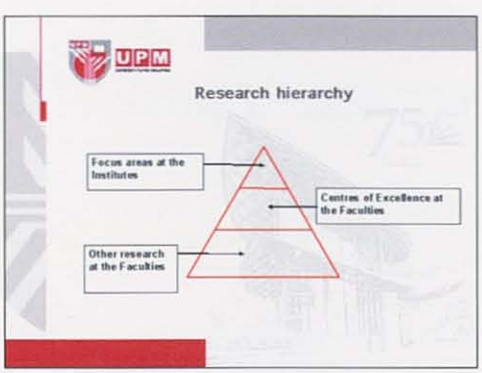
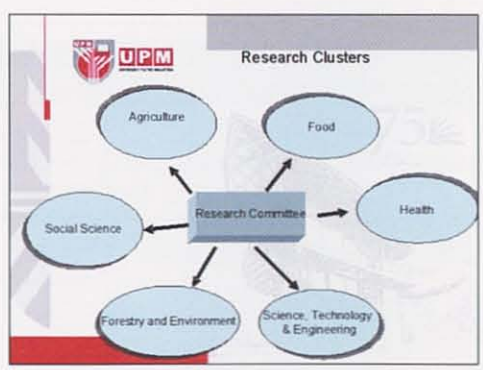
■ *From Page One*

A few niche areas such as gerontology, mathematical and theoretical studies and social science studies will be retained. Under the rationalisation process, these institutes/ academies/ centres were streamlined into 9 research institutes, 1 academy and 2 centres. To oversee the development and progress of the R&D at the university, 6 research clusters have also been identified. A University Research Committee comprising heads of each cluster would be formed.



The research committee will be coordinating the overall research in the university. A 3-tier research pyramid is envisaged with the focus areas being at the top and addressed by the Institutes. As such, the role of the institutes is to really undertake high end or cutting research that will result in research products of high quality and productivity. It is hoped that UPM can now concentrate on the national agenda to achieve the Key Performance Index (KPI) set and thus make the university a real centre of excellence; an achievement that we can be proud of.



Banana plantation almost completely destroyed *by Fusarium wilt.*

Direct Fermentation of Sago Starch to Various Commercial Products

Award Winner

Arbakariya B. Ariff, Rosfarizan Mohamad, Suraini Abd Aziz, Raha Abd Rahim, Akihiko Kondo and Suteaki Shioya

Biotechnology may have grown remarkably in the past 10 years but one of the reasons that restrain its dominance over chemical processing is the type of raw materials that are used. Prices of fermentation feedstocks are not competitive in comparison with fossil fuel sources of carbon. In addition, the need for cheap and efficient raw materials for bioprocessing is increasing rapidly and the carbohydrate extraction industry

A photograph of 2 L stirred tank bioreactor used for direct fermentation of sago starch to solvent (acetone-butanol-ethanol)

(fermentable sugar) is unable to meet such requirements because it is largely based on old technology with many equipment and high-energy requirements. In this old technology, starch has to be hydrolysed using two steps enzymatic process, liquefaction and saccharification, into fermentable sugars for subsequent use as substrate in fermentation

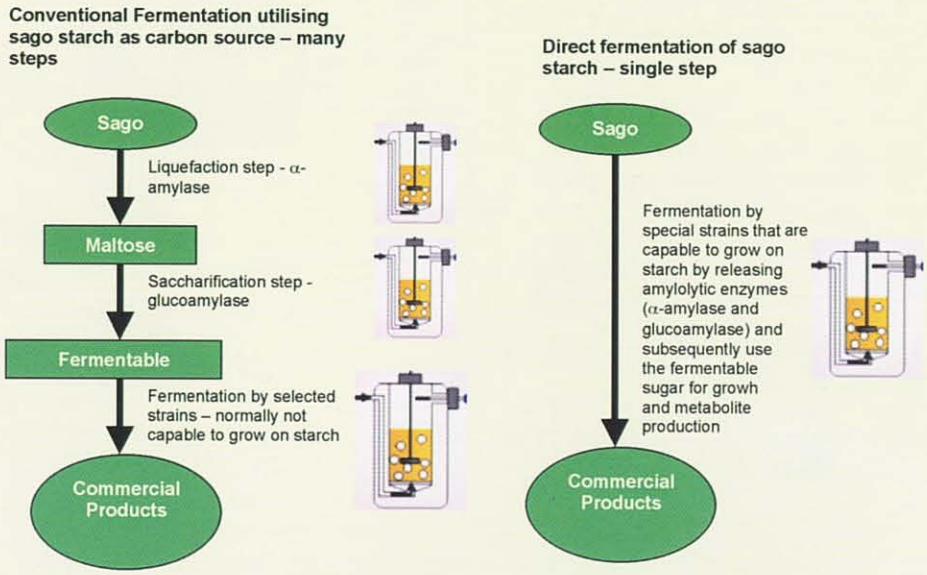


Figure 1 Comparison of between newly developed and old technology normally practice in industry for production of commercial products through fermentation process using starch as raw materials.

(Figure 1). Many bioreactors employed in the production line and the processes were operated at high temperatures, 90-105°C for liquefaction and 55°C for saccharification processes.

A solution to this problem was achieved by developing fermentation processes which directly used sago starch for the conversion to commercial products. In this technology, special microbial strains are used in the fermentation processes where they are capable to grow on starch by releasing amylolytic enzymes such as α-amylase and glucoamylase, and the fermentable sugars produced are subsequently used for growth and metabolite production (Figure 1). In this case, only a single step process is involved and the number of bioreactor required in the production line is greatly reduced. This technology may reduce the production cost by about 40 to 70%.

Our research group have developed several fermentation processes using sago starch as green feedstock for the production of major fermentation products, such as bioethanol, biosolvent (acetone-butanol-ethanol), and various bulk commodity chemicals, such as industrial enzymes (α-amylase, glucoamylase, pullulanase and CGtase), kojic acid, lactic acid and natural preservatives (please see Table 1 for the details). RMC

Bronze – *Biotechnology Asia 2005 Innovation Awards.*

Table 1 Example of direct fermentation of sago starch to various commercial products developed by our research group.

Product	Microorganism	Description of fermentation process	Yield based on sago starch consumed
Solvent (acetone-butanol-ethanol)	*Clostridium saccharobutylicum*	Batch fermentation using 2 L stirred tank fermenter where pH was not controlled during acidogenic phase (initial culture pH was 6) and then the pH was controlled at 5.5 during solventogenic phase.	0.55 g solvent/g starch
Kojic acid	*Aspergillus flavus strain 33-2*	Fed-batch fermentation technique, using 50 L stirred tank fermenter, to overcome problem associated with high viscosity starch which limits mass transfer and hence, reduced fermentation performance.	0.45 g kojic acid/g starch
Ethanol	*Recombinant Saccharomyces cerevisae*	Fed-batch fermentation where starch was added intermittently to the culture.	0.72 g ethanol/g starch
Pullulanase	*Raoultella planticola*	Batch fermentation in 2 L stirred tank fermenter with optimal operating variables (agitation speed and air flow rate)	369 U pullulanase/g starch
Glucoamylase	*Aspergillus awamori*	Batch fermentation in 10 L stirred tank fermenter	1.42 U glucoamylase/ g starch

Reader Enquiry

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SaTri-A Gold

Award Winner

Mariana Nor Shamsudin, Neela, V. and Raha Abdul Rahim

SaTri-A Gold is a golden kit for the rapid detection of bacterium *Staphylococcus aureus*. This kit is golden indeed because it has extended valuable applications and incidentally the bacterium has a shining unique golden tinge (pigmentation) in its colonial growth, hence the species name given as aureus which means gold in Greek.

SaTri-A Gold: *A golden kit for the Molecular detection of Multiple Drug Resistant Enterotoxigenic (MDRET) Staphylococcus aureus*

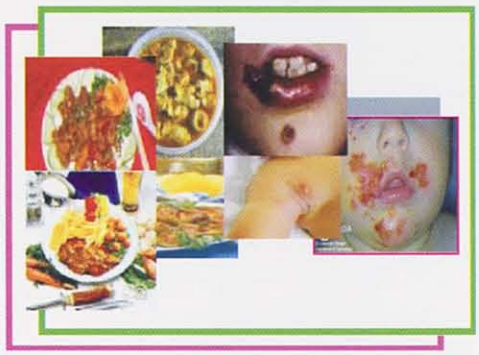
Humans are natural reservoir for *S. aureus* with carriage rates varying from 25 to 50%. Although sounds like friendly normal flora of human, *S. aureus* is a dangerous bacterium when it becomes a **"Superbug"**. *S. aureus* is called Super-superbug because the strains can be virulent (disease causing), multiple drug resistant and the enterotoxins are superantigenic. Two most highlighted threatening issues of this Superbug are multiple drug resistant (resistant to commonly used antibiotics) property and food poisoning outbreak strains.

The commonly high prevalence of food poisoning outbreaks locally and worldwide is associated to the unique abundance of *S. aureus* in the community especially among the food handlers. Overlooking the fact that human are carriers especially among food handlers and the ubiquitous nature of the organism, the spreading of enterotoxigenic strains has resulted in massive and frequent food poisoning outbreaks. Each year 76 million cases of food borne illness (FBD) worldwide with more than 7,000 cases reported in Malaysia. Confronted with high prevalent rates, FBD incur substantial economic loss to the global community through direct medical expenses, lost of productivity and working days for affected parties.

Rampant spread of enterotoxigenic strains in the community setting is further compounded by the transmission of multiple drug resistant strains from hospital setting to the community. The antibiotic susceptibility of this enterotoxigenic strains in normal instances are not tested, as antibiotics are not commonly prescribed for enteric diseases due to the fact that normal flora will be disrupted. The alarming fact is the acquisition of the antibiotic resistant genes by the enterotoxigenic strains relent them to become multiple drug resistant enterotoxigenic (MDRET) strains. If the phenomena goes unchecked, there will be a rise in the spectra of MDRET emerging in the wider population. Dramatic rise in the spread of MDRET strains through the food handlers, school canteens, mass food production, food products exporter could be controlled if these superbugs are detected at the earliest.

Detection of such (MDRET) new dangerous strain is a challenge as the available detection systems are not rapid and also are not designed to detect multiple properties. Many years of intense research has attributed us to formulate a rapid and simple DNA based diagnostic kit for the detection of MDRET strains. SaTria-A Gold as portrayed earlier is a golden kit, as it has plethora of valuable features that can detect MDRET strains in a single reaction directly from samples. For the convenience of the customers the kit was designed with dual assays, which include multiplex PCR and non-PCR probe assay with triple actions of detecting multiple drug resistance, enterotoxigenic and *S. aureus* identity.

The key feature of this kit is that, both assays will enable users to detect the various strains of *S. aureus* in a very short time. This kit will act as an early warning system in detection of enterotoxigenic strains so as to prevent many forthcoming outbreaks. In addition, fast detection will also allow early response to outbreaks since the kit can reveal antibiotic susceptibility pattern leading to appropriate administration of drugs.



SaTri-A Gold: *Detection of MDRET Staphylococcus aureus from diverse sources (Clinical and Environmental)*

Hence, SaTria-A Gold kit is a rapid, time saving and economical kit with multiple field applications. The community who will be benefit from this kit is immeasurable, however to highlight upon a few, the key beneficiaries will be food production industries, food handlers, food importers and exporters, and medical care providers. Public Health can also benefit for establishing informative database on MDRET *S. aureus* strains for the management of this Super-super bugs.

Bronze – *IPTA R&D Expo 2005 Award.*
SILVER – *UPM Invention and Research Exhibition (PRPI 2005).*
SILVER – *UPM Invention and Research Exhibition (PRPI 2003).*
GOLD – *UPM Invention and Research Exhibition (PRPI 2003).*
Bronze – *International Invention Innovation Industrial Design & Technology Exhibition (I-TEX 2003).*

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Research

I-TEX 2006 *(21 May 2006)*

MEDALS OF HONOUR: It was a proud moment for UPM once again when it won 30 awards out of the 34 R&D products it exhibited, comprising 8 Gold, 11 Silver and 8 Bronze medals, and 2 Special Awards.

BEING PROGRESSIVE: Dr. Sieo Chin Chin *(right)* from Biotechnology and Biomolecular Sciences, a Silver medal winner explaining her innovative research on microbes for enhancing poultry industry to the judges while Prof. Dr. Ho Yi Wan *(centre)* listening attentively.

GLORIOUS ACHIEVEMENT: Prof. Dr. Aini Ideris from Veterinary Medicine won a Gold medal for her novel research on NDReal check, sharing happy moments with her postgraduate student.

I DID IT: Prof. Dr. Abd. Halim Shaari from Science won two Silver medals showcasing his pioneering research to the judges.

GOING INTO DETAILS: Dr. Mahendran Shitan *(left)* from INSPEM, another Silver winner displaying his inventive mathematical research while Prof. Dr. Fatimah Md Yusoff, Director, IBS and a judge look on.

JOYOUS MOMENTS: Assoc. Prof. Dr. Tan Wen Siang from Biotechnology and Biomolecular Sciences received a **Gold** medal and a **Special Award**: *"Best Invention in Biotechnology"* presented by Ram Rais & Partners for his inventive research on NipahScan™. Seen in the picture is his representative receiving the awards.

NO GUESSWORK: Prof. Dr. Abd. Halim Shaari from Science receives yet another award — a Silver medal.

SEEKING ROYALTIES: Representatives from INSPEM proudly displaying their awards.

SEEDS OF CONTENT: *(from left)*, Prof. Dr. Abu Bakar Salleh, Deputy Vice Chancellor (Research and Innovation), Prof. Dr. Zulkifli Idrus, Director (RMC) with Assoc. Prof. Dr. Fauziah Othman from IBS, a Silver medal winner.

SYMBOLISM IN ACTION: Prof. Dr. Abu Bakar Salleh *(right)* — *Scientists:* Invisibility possible in future!

National Intellectual Property Day *(Expo Hari Harta Intelek Negara)*
(26-30 April 2006)

APPRECIATION: Deputy Prime Minister, Y.A.B. Dato' Sri Haji Mohd. Najib Bin Tun Haji Abdul Razak during his visit for this event.

CONFIDENT: Assoc. Prof. Dr. Fakhru'l-Razi Ahmadun *(left)* Deputy Director, RMC and Assoc. Prof. Ir. Dr. Mohd. Razali Abdul Kadir from Engineering obtained several patents for their pioneering researches.

WARM WELCOME: Y.B. Datuk Hj Mohd. Shafie Bin Haji Apdal *(centre)*, Minister for Domestic Trade and Consumer Affairs and his assistant Y.B. Dato' Veerasingam A/L Suppiah *(right)*, the Deputy Minister being welcomed.

QUEST FOR R&D: Assoc. Prof. Dr. Raja Noor Zaliha showcasing her research to Y.B. Datuk Hj Mohd. Shafie Bin Haji Apdal.

CHALLENGING GOALS: *(right)* Assoc. Prof. Dr. Raja Noor Zaliha obtained patents from Malaysia, Switzerland, United Kingdom and United States

GEARED FOR COMMERCIAILSATION: Assoc. Prof. Dr. Fakhru'l-Razi Ahmadun from Engineering obtained two Malaysian patents for his novel researches.

Geneva-Palexpo 2006 *(5-9 April 2006)*

READY FOR A CHALLENGE: UPM Deputy Vice-Chancellor (Research & Innovation), Prof. Dr. Abu Bakar Salleh presenting the Malaysian Pride to the *Chief de mission*, Assoc.Prof. Dr. Mohamad Pauzi Zakaria before his departure for Geneva.

KEEPING THE
Hawa Ze Jaafar
'good luck charm

TOWARDS BETTER LINKAGES: Assoc. Prof. Dr. Asmah Rahmat from Bioscience is all revved up to exhibit her innovative R&D overseas!

INTERNATIONAL
Dr. Asmah Yahaya fr
another scientist set
research findings int

Happenings

TENSIVE IDEAS: Prof. Dr. Yaakob e Man from IMH won a Bronze medal his pioneering research on application FTIR spectroscopy for food quality ntrol and Halal authentication.

RESPECTED MENTOR: Prof. Dr. Son Radu *(2nd from left)* from Food Science and Technology won a Silver medal for his novel research. He is always held in high esteem by his postgraduate students.

GREAT EFFORT: Ir. Azlan Abdul Aziz *(left)* from Engineering receives a Bronze medal for his inventive research on *"a long term triaxial filtration test system"* from a representative from the MINDS — the organizer of this event.

SCRABBLING FOR SUCCESS: Representative of Assoc. Prof. Dr. Noor Akma Ibrahim *(left)* from INSPEM receiving a Bronze medal

REWARDED: Professor Dr. Mohd Yazid Abdul Manap from Food Science and Technology received a Bronze medal. Seen in the picture is his representative receiving the medal.

NERGIES: *(from left)* Prof. Dr. Zulkifli is and Assoc. Prof. Dr. Fauziah Othman eir lighter moods — *"a healthy dose of nour makes your office a nicer place to k in".*

PROACTIVE LEADERS: The former Prime Minister Tun Dr. Mahathir bin Mohamad sharing some words of wisdom with Tan Sri Datuk Dr. Augustine Ong, the founding president of Malaysian Invention & Designs Society (MINDS).

STAYING STRONG: Former Prime Minister Tun Dr. Mahathir bin Mohamad receiving a token of appreciation from Tan Sri Datuk Dr.Augustine Ong.

GRAND HAUL: Prof. Dr. Zulkifli Idrus receives the Silver Award for the Best Booth Design in the *Open Space Category* for the university.

FRUITFUL: Dr. Renuganth Varatharajoo represented by Assoc. Prof. Ir. Dr. Norman Mariun, Deputy Dean (Research), Engineering receiving the *Innovative Product Award.*

ITS HIGH: Assoc. Prof. Dr. griculture receiving the Prof. Dr. Abu Bakar.

EXULTATION: Dr. Aini Mat Said from Human Ecology is all set to win awards.

A DUTY AND AN OBLIGATION: Assoc. Prof. Hasan Selamat from Computer Science and Information Technology receiving the UPM Honour.

MARKING THE OCCASION: Mr. Muhammad Rezal Kamel Ariffin from INSPEM receiving the flags and some *words of wisdom* from Prof. Dr. Abu Bakar Salleh.

BOOST FOR RESEARCH: Prof. Dr. Kaida Khalid from Science on his way to spawn innovation.

H: Assoc. Prof. ence is yet bit her innovative nally.

SCIENTISTS SHOWCASE: Assoc. Prof. Dr. Fakhru'l-Razi Ahmadun *(left)* and Dr.Aini Mat Said *(extreme right)* with two scientists from France keen in research collaboration.

TEAM WORK: Assoc. Prof. Dr. Mohamad Pauzi Zakaria *(centre front row)*, as the Chief of UPM Delegacy with other UPM team at the exhibition.

FINAL CURTAIN: UPM team members at Geneva Airport, Switzerland just before their return to Malaysia after wining 8 awards — 3 Gold, 2 Silver and 3 Bronze medals.

A PLATFORM THAT *FILTERS* CONTENT: Prof. Dr. Abu Bakar Salleh exchanging views with Prof. Dr. Zulkifli Idrus during the ceremony.

The Human Security System (S 3000)

Hesham Adel Mahmoud Assem and Azni Idris

The Human security system (S 3000) is designed to detect illegal intruders and to alert the home owner. In the event when home owners are sleeping or are out of their house, they can with the help of this security system monitor their house. In case of any illegal intruders entering the house or a possible theft, the alarm gets triggered and the house owner is alerted via cell phone or a normal telephone line, or by an alarm system.

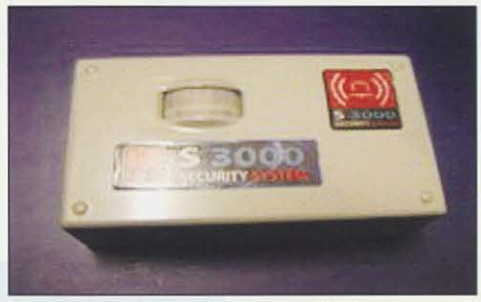
The Human Security System (S3000) — for a safe environment

This system uses an intelligent human sensor which acts as a security system, as well as a safety device. In addition, the human sensor has many other applications and serves many other useful purposes. eg. by minor modifications it can be used for elderly people with poor eyesight or no vision without having to use a walking stick as it can detect any obstacles that might cause accidental threat as they walk in congested areas.

Most of the security systems designed so far send alarm messages to users when the sensors are triggered, and can not identify precisely that the intruder is necessarily a human. For instance, the alarm could send a wrong signal even with a pet trespassing the secured area. However the human sensor used in this security system detects only human, and does not malfunction with pets or animals to avoid a possible false alarm caused by an animal or pets in the vicinity.

In addition, the human sensor used in this system can also be used in other applications such as in protection/safety devices to protect human from any accidents caused by the malfunction of the machinery during its operation or accidents caused by human error involving loss of human limbs etc.

The system **(S 3000)** is designed to make sure the alarm is switched on as a result of human intruders only. Another advantage of this system is that more functions can be added as per needs of individuals.



This system uses an intelligent human sensor — detects only human, and not pets or animals

Experimental results have successfully demonstrated that (S 3000) can also be connected with light/ flash indicators, telephone line or hand phone that can send a system prompt to the user when they are away from their home notifying of the mishap, or in case an intruder enters the protected premises for theft etc. RMC

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Mesocarp-Specific Promoter for Oil Palm Genetic Modification

■ *From Page One*

The availability of temporal and tissue-specific gene promoters is essential for the effort to modify mesocarp oil composition by genetic engineering. Such promoters must be able to drive specific expression of introduced genes during the period of oil synthesis (15-20 weeks after anthesis) and preferentially produce an expression pattern similar to that of a fatty acid biosynthetic gene in the mesocarp.

cDNA clone of a mesocarp-specific and highly expressed metallothionein-like gene (*MT3-A*) was isolated. Temporal and spatial expression profile of *MT3-A* correlates strongly with that of a fatty acid biosynthetic gene, stearoyl-ACP desaturase (Fig. 1). The promoter sequence of *MT3-A* designated MSP1 of about 1.0 kilobase was isolated and fully sequenced. The specificity of the promoter was confirmed by transient assay analysis on oil palm tissue slices using and β-glucuronidase (GUS) as reporter gene (Fig. 2).

Backbone vector constructs containing MSP1 for oil palm transformation were produced (Fig. 3). This has enabled utilisation of MSP1 by Malaysian Palm Oil Board (MPOB) in their genetic engineering endeavours to modify mesocarp oil composition. These include efforts to produce high oleate oil for diversification into liquid oil market, high stearate oil as high value cocoa butter substitutes and high palmitoleate oil for pharmaceutical applications.

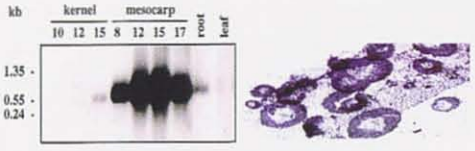

Fig. 1 Temporal and Spatial Expression Profile of *MT3-A*

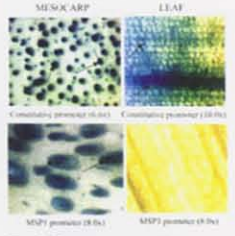

Fig. 2 Mesocarp-specific Activity of MSP1

The MSP1 promoter sequence and its applications in controlling expression of genes and in producing genetically engineered products have been filed for patent application (PI 20021165). This R&D also has been filed for patent in other countries including Malaysia, USA and Brazil by Malaysian Palm Oil Board (MPOB). RMC

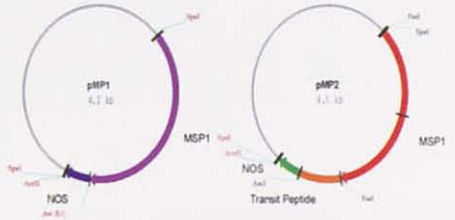

Fig. 3 Backbone Vectors Containing MSP1 for Oil Palm Transformation

Bronze – *Biotechnology Asia Innovation Awards 2005.*

Reader Enquiry

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Synthesis and Fabrication of NiZnCu ferrite Cores via Sol-gel Technique

Souilah Zahi, Mansor Hashim and A.R. Daud

A sol-gel technique has been developed to synthesize and fabricate ferrites cores. These are very important elecro-magnetic cores in the electronic devices. The benefits of this technique are its advantages which could overcome the following problems raised from the conventional method, i.e. poor compositional control and poor mechanical hardness, chemical in homogeneity, coarser particle size and introduction of various impurities during the ball-milling/ grinding. Similarly, the coarse and non-uniform particles, on compacting, result in the formation of voids or a low density area in the green compacted body. Hence, on sintering, one ends up with non-reproducible products, mainly in term of their magnetic properties.

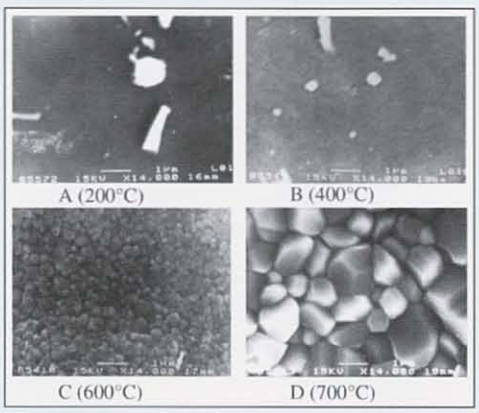

Fig 1

The sol-gel synthesis is a very new technique in which small colloidal particles are first formed in the sol(ution) by hydrolysis the organic compounds (Eq.). They first link to form a gel(ation), and then the fabrication of the core starts with calcinations at the discovered lowest temperature, granulating using the PVA and zinc stearate, pressing at the pressure of 220 MPa and sintering at a higher temperature.

$$0.3\ Ni(CH_3COO)_2 + 0.6\ Zn(CH_3COO)_2 + 0.1\ Cu(CH_3COO)_2$$

$$+ 2\ Fe(CH_3COO)_3 \rightarrow Ni_{0.3}Zn_{0.6}Cu_{0.1}Fe_2O_4 + \text{volatilities}$$

The main result is the ability of this technique to form ferrites at a lowest heating temperature which is about 50% below the temperature in the conventional process (Fig 1.). The sol-gel technique also reduces the sintering temperature and time of preparation, which leads to other advantages such as saving energy, no reaction to containers thus increases purity and minimizes evaporation loss, as well as the high homogeneity of the ferrite, small grain size and well crystallized final particles have been achieved.

The fabricated ferrite cores

Reader Enquiry

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FluReal H9N2 Check, a Rapid Detection and Sub-typing Kit for Influenza Virus

Abdul Rahman Omar, Aini Ideris, Sharifah Syed Hassan, Ong Wee Theng and Hazalina Zulkifli

Award Winner

Several routine diagnostic methods are available for the detection of avian influenza virus (AIV) including the gold standard method of virus isolation and serology tests.

A Rapid Detection and Sub-typing Kit for Influenza Virus

Rapid advances have been made in the development of real-time PCR techniques in the detection of type A influenza virus. In most of the studies, detection of AIV was based on real-time PCR assays utilizing probe labeled with TaqMan or FRET technology. However, the test is rather complex to run and also expensive. In addition, the assay format needs to be run on a multi-channel real-time PCR platform.

On the other hand, the real-time PCR assay developed in this study uses a cheaper dye, Sybr Green I compared to Taqman/FRET. This study describes for the first time, a one-tube multiplex Sybr Green I based real-time PCR for simultaneous detection of type A influenza viruses and subtyping of a potential pathogenic AIV subtype H9N2. Sequence analysis of the detected products confirmed the specificity of the developed assay.

The assay offers several other advantages over standard RT-PCR such as the reduction of handling infectious materials and results are obtained before the PCR steps end. Additionally, the assay can simultaneously perform detection and subtyping (H9N2) in a single closed-tube PCR reaction to avoid cross-contamination. This is performed on a standard (default) one-color real-time PCR platform which is relatively cheaper than multi-channel real-time PCR systems. The assay is intended to be applied in the laboratory for the detection of type A AIV and subtyping of pathogenic AIV – H9N2 from various species of animals particularly commercial poultry, ducks, geese and also exotic/pet birds including quails and migratory/wild birds.

The currently available laboratory tests are tedious whilst commercially available tests are expensive. The technology used in this assay can be easily modified to detect other AIV subtypes, including the highly pathogenic avian influenza virus, H5N1.

GOLD – *UPM Exhibition of Invention, Research & Innovation 2005 (PRPI 2005).*

SILVER – *Malaysia Technology Expo 2006 (MTE 2006).*

Reader Enquiry

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NewsBriefs

I-TEX (2006)

The 17th International Invention, Innovation, Industrial Design and Technology Exhibition Malaysia (I-TEX 2006) was held at the Kuala Lumpur Convention Centre from 19 to 21 May 2006. I-TEX is organized every year by the Malaysian Invention and Design Society (MINDS) with a goal to help the creators bring their inventions to society. This year I-TEX focused on two main categories—Biotechnology, and Renewable Energy .The exhibition provides the ground for inventors, innovators and industrial designers to meet and exchange creative concepts with entrepreneurs, researchers, venture capitalists and manufacturers.

UPM exhibited a total of 34 innovative R&D products mainly from Agriculture, Biotechnology, Health & Fitness, Environmental and Renewable Energy, Materials, Aerospace & Aviation, Building and Construction, Industrial Design, and Industrial Equipment. Out of an impressive overall count of 354 exhibits that were displayed by various exhibitors, UPM garnered 32 awards comprising 8 gold, 11 silver and 8 bronze medals. In addition, it also received one special award, one Innovative product award and a silver award for the Best Booth Design in the open space category. Besides the 8 gold medals, the CNG-DI Engine and Transmission project headed by Prof. Barkawi Sahari won yet another Gold, and a Hemdry Goh Special Award.

Dr. Ahmad Bustamam Abdul from Institute of Bioscience received a gold medal for his inventive research, *"A natural compound, isolated and purified from a local herbal plant, interferes with cervical intra epithelial carcinoma progression"*. Prof. Dr. Abd. Manaf Ali also from Institute of Bioscience received another gold medal for his innovative research, *"Local isolates of Newcastle Disease Virus as Antileukemic Vaccine"*. Dr. Mohd Yunus Abd. Shukor and Assoc. Prof. Dr. Tan Wen Siang from Biotechnology and Biomolecular Science also got gold for their novel research, *"Monitoring of heavy metals pollution in Malaysian rivers using an inhibitive enzyme assay system"* and *"NipahScan™: A Rapid Screening Test For the Detection of Nipah Virus Infection"* respectively. Prof. Dr Aini Ideris and Assoc. Prof. Dr. Md Zuki Abu Bakar from Veterinary got yet another gold for their inventive research, *"NDReal check, a rapid kit to detect Newcastle Disease Virus pathotypes"* and *"Biomaterial for repair of full thickness abdominal wall defect"* respectively. Assoc. Prof. Dr. Nazamid Saari from Food Science and Technology received another gold for his innovative research, *"Termostable Lipase from local strains of Lipase-producing Termophilic Bacteria"* and last but not the least Dr. Tey Beng Ti from Engineering received yet another gold for his inventive research, *"An efficient mechanical cell disruption method for the release of recombinant HBcAg from Escherichia Coli"*.

Recipients of Silver and Bronze medals are given below:

	Medal	Award Recipient
1.	Silver	Fauziah Othman (Assoc. Prof. Dr.) – *Bioscience (IBS)*
2.	Silver	Khozirah Shaari (Assoc. Prof. Dr.) – *Bioscience (IBS)*
3.	Silver	Mohd Yunus Abd. Shukor (Dr.) – *Biotechnology and Biomolecular Sciences*
4.	Silver	Sieo Chin Chin (Dr.) – *Biotechnology and Biomolecular Sciences*
5.	Silver	Mohd Ridzwan Abd. Halim – *Agriculture*
6.	Silver	Rosenani Abu Bakar (Dr.) – *Agriculture*
7.	Silver	Mahendran Shitan (Dr.) – *Mathematical Research (INSPEM)*
8.	Silver	Abd. Halim Shaari (Prof. Dr.) – *Science*
9.	Silver	Abd. Halim Shaari (Prof. Dr.) – *Science*
10.	Silver	Son Radu (Prof. Dr.) – *Food Science and Technology (FSTM)*
11.	Silver	Megat Johari Megat Mohd Noor (Assoc. Prof. Ir.) – *Engineering*
12.	Bronze	Rita Muhamad (Assoc. Prof. Dr.) – *Agriculture*
13.	Bronze	Habshah Midi (Assoc. Prof. Dr.) – *Mathematical Research (INSPEM)*
14.	Bronze	Noor Akma Ibrahim (Assoc. Prof. Dr.) – *Mathematical Research (INSPEM)*
15.	Bronze	Nor Azah Yusof (Dr.) – *Science*
16.	Bronze	Yaakob Che Man (Prof. Dr.) – *Halal Food (IMH)*
17.	Bronze	Azizah Osman (Assoc. Prof. Dr.) – *Food Science and Technology (FSTM)*
18.	Bronze	Mohd Yazid Abdul Manap (Prof. Dr.) – *Food Science and Technology (FSTM)*
19.	Bronze	Azlan Abdul Aziz (Ir.) – *Engineering*

In addition to receiving a gold medal, Prof. Dr. Tan Wen Siang from Biotechnology and Biomolecular Science also received a Special Award for his best invention in Biotechnology for his inventive research, *"NipahScan™: A Rapid Screening Test For the Detection of Nipah Virus Infection"* presented by Ram Rais & Partners. Dr. Renuganth Varatharajoo from the Engineering faculty received the *"Innovative Product"* award for his pioneering research entitled, *"A Novel Hybrid Spacecraft Attitude Control System"*.

Turn to centre page for pictorial news.

National Intellectual Property Day Expo 2006

The National Intellectual Property Day Expo 2006 or *"Expo Hari Harta Intelek Negara"* was held at Kuala Lumpur Convention Centre from 26-30th April 2006. The event aimed to raise the public consciousness that intellectual property plays as a catalyst in the development of economy, social and culture. Besides that, this event also provided recognition by government to those researchers who have made valuable contributions to the advancement of technology, research and innovation development in the country.

Scientists from UPM received seven patents / patent-pending for their researches. Assoc. Prof. Dr. Syed Omar Syed Rastan from Agriculture obtained a Malaysian patent for his invented research, *"Seed Treatment Reagent for Direct Seeding Paddy Rice-ZAPPA"*. Assoc. Prof. Dr. Raja Noor Zaliha Raja Abdul Rahman from Biotechnology and Biomolecular Science received patent status for her novel research, *"Novel Geobacillus microorganism / Lipase From Geobacillus sp Strain T1"* from Malaysia, Europe, United States and Japan Assoc. Prof. Ir.Dr. Mohd. Razali Abdul Kadir from Engineering obtained patents granted by Malaysia, Switzerland, United Kingdom and United States for his invented research, *"Interlocking Mortarless Load Bearing Building Block Systems / Putra Block"*. Assoc. Prof. Badlishah Sham Baharin from Food Science and Technology received a Malaysian patent for his invented research, *"Extraction of Vitamin E from Palm Fatty Acid Distillate by Absorption Chromatography"*. Dr. Aini Mat Said from Human Ecology also successfully obtained copyright her new research software, *"Expert System for Socio-technical Disaster Management"*. Assoc. Prof. Dr. Fakhru'l Razi Ahmadun from Engineering obtained two Malaysian patents for his invented researches, *"Microbiol bioconversion of sewage treatment plkant (STP) sludge by LSB and SSB into soil nutrient for ultimate environmental friendly disposal"* and *"Floating catalytic chemical vapour deposition (FCCVD) apparatus for the Syntesis of carbon nanotube (CNT) and Nano-materials"*.

Turn to centre page for pictorial news.

FactFile

For the record

Looking Outward—RMC revamps!

This year has been one of change for the University. New staff, new buildings and new goals are just some of the things that show UPM to be a dynamic place, adapting to the needs of the new century. Ringing such changes, RMC has undergone many changes as well. It now has 4 units to reflect impressive developments.

It now has an additional unit, Knowledge Management Unit which is headed by a new deputy director, Assoc. Prof. Dr Adzir Mahdi from the Faculty of Engineering. The unit would be responsible for maintaining of Research Management Systems, UPM academia's expertise including KM Portal; monitoring and auditing data for Research University, etc.

The Publication, Promotion and Systems Unit has been split into two separate units— The Publicatuion Unit and The Promotion Unit. The Publication Unit is responsible for production of research related publications and research reports including UPM's only official R&D bulletin, Synthesis, and UPM's Journals—the 3 Pertanika series.

The Promotion Unit is now responsible for organizing R&D exhibitions at both national and international levels. The Unit is also seeking ways to enhance UPM's research excellence by promoting UPM's R&D by publicity by distributing printed materials in relation to R&D activities and publications in UPM.

The Policy, Planning and Finance Unit has been dissolved with effect from 1st June 2006. All matters related to research policies etc are now directly under the directive of Deputy Vice-Chancellor (Research & Innovation)

The Research Grant Unit is still responsible for the management and administration of research fundings and related activities. The unit also facilitates research grant applications, sourcing for research grants, enhance expertise of research groups and networking and monitoring of research projects.

RMC is very pleased to welcome Assoc. Prof. Dr Adzir Mahdi as its Deputy Director, and Head of RMC's newly established Knowledge Management Unit.

1 Mohd Adzir Mahdi received his B.Eng. degree from the Universiti Kebangsaan Malaysia, and M.Sc. and Ph.D. degrees from the Universiti Malaya in 1996, 1999 and 2002 respectively. He joined the Department of Computer and Communication Systems Engineering, Faculty of Engineering, Universiti Putra Malaysia on January 21, 2003 as an associate professor. He is now the deputy director of Knowledge Management Unit at Research Management Center. Prior to the current appointment, Adzir was the optical design engineer at IOA Corporation, Sunnyvale, USA.

Assoc. Prof. Dr Adzir Mahdi, Deputy Director, RMC.

He has been involved in photonics research specializing in optical amplifiers and lasers since 1996. His notable research contributions in this area have earned him international recognition and he has to his credit several awards; IEEE LEOS Graduate-Student Fellowship and IEEE LEOS Best Student Paper Award, both in the year of 2000. He has published more than 190 technical papers in journals and conference proceedings.

Adzir is a senior member of the Institute of Electrical and Electronics Engineers. He is also a member of the Optical Society of America and the International Society for Optical Engineering. He could be contacted at 03 8946 6438 or via email at mdadzir@eng.upm.edu.my.

2 Ms. Haslida Hassan has taken over as Senior Assistant Registrar, Research Management Centre (RMC) with effect from 1st June 2006. She heads the administrative division of RMC. Ms. Haslida could be contacted at 03 8946 6031 or via email at haslida@putra.upm.edu.my.

Ms. Haslida Hassan, Senior Assistant Registrar, RMC.

3 Mr. Jamsari Tamsir has left Research Management Centre to be the Special Officer to Deputy Vice-Chancellor (Research and Innovation) effective 1st June 2006. Prior to his appointment with the Deputy Vice-Chancellor, he was the Deputy Registrar with RMC responsible for all administrative affairs of the centre. He could be contacted at 03 8946 6030 or via email at jamsari@putra.upm.edu.my.

Mr. Jamsari Tamsir, Special Officer to Deputy Vice-Chancellor (Research & Innovation)

4 Ms. Low Ying Ying joined Research Management Centre as an Assistant Publications Officer to assist the Publication Unit with effect from 24th July 2006. She replaces Ms. Ranjitha Bala who left RMC in February 2006.

Ms. Low Ying Ying, Assistant Publications Officer, RMC

Having worked in the private and public sectors on issues pertaining to education and R&D, Ying Ying states she is ambitious, a goal-oriented person and able to work under pressure in a fairly organized environment. She says, she is a self motivated and dedicated person with an aptitude for acquiring the proficiency in the field of publishing.

Ying Ying holds a Bachelors degree in Science from Universiti Sains Malaysia.

A Glance at Research Inventions & Innovations at UPM[1]

Continued from Issue 12, 1st Quarter (Mar. 2006)...

No.	Faculty/ Institute	Researcher	Innovation	Research Cluster	Project Number	Allocation
317.	Science and Environmental Studies	Md.Jelas Haron	Removal of heavy metal oxyanions from aqeous systems by modified chelating exchanges	SAE	09-02-04-0439 EA001	RM121,000
318.	Science and Environmental Studies	Md.Nordin Hj.Lajis	Investigation on the Cytotoxity and Antimicrobial compounds of Garcinia penangiana and G.nigrolineate	BAB	09-02-04-0313 EA001	RM163,884
319.	Science and Environmental Studies	Md.Nordin Hj.Lajis	The evaluation, production and derivatisation of the citric acid in Garcinia antroviridis	BAB	09-02-04-0440 EA001	RM181,884
320.	Science and Environmental Studies	Misri Kusnan	Eco-biological aspects of tiger shrimp culture pond with the emphasis on the role of micronutrients in shrimp pond productivity	AFF	01-02-04-0520 EA001	RM123,600
321.	Science and Environmental Studies	Mohamed Ibrahim Mohamed Tahir	Relationship between molecular structure and bioactivity of nitrogen-sulfur, nitrogen-oxygen-sulfur donor ligand and their complexes with transition and non-transition metals	BAB	09-02-04-0755-EA001	RM206,540
322.	Science and Environmental Studies	Mohd. Arif Syed	Isolation and characterization of particide degrading microorganism from Malaysia soils	AFF	08-02-04-0243 EA001	RM111,560
323.	Science and Environmental Studies	Mohd. Aspollah Hj. Sukari	Characterization and Utilization of bioactive constituents from Curcuma heyneana, Curcuma mangga and related species	BAB	09-02-04-0444 EA001	RM140,000
324.	Science and Environmental Studies	Mohd. Basyaruddin Abd. Rahman	Studies and Characterization of Enzyme Immobilized onto Layered Double Hydroxides	BAB	09-02-04-0816-EA001	RM95,000
325.	Science and Environmental Studies	Mohd. Basyaruddin Abd. Rahman	A Semisynthetic Metallaoenzymes: Novel Catalysts for Petrochemicals and Esterification	SAE	09-02-04-0320 EA001	RM230,000
326.	Science and Environmental Studies	Mohd. Maarof H.A Moksin	Thermal wave investigation of phonon-phonon and phonon-electron interactions in high temperature superconductors at temperatures around Tc	SAE	02-02-04-0133 EA001	RM229,720
327.	Science and Environmental Studies	Mohd. Nasir Hassan	Development of a knowledge-based life cycle assessment (LCA) of municipal solid waste management and recycling systems in Malaysia	MEE	08-02-04-0244 EA001	RM169,000
328.	Science and Environmental Studies	Mohd. Noor Abd. Wahab	B-1.3 glucan level of Ganoderma lucidum, Ganoderma tsugae and Ganoderma tropicum	BAB	09-02-04-0322 EA001	RM120,500
329.	Science and Environmental Studies	Mohd. Pauzi Zakaria	Polycyclic Hydrocarbons (PAHs) in Urban and Remote Areas of Peninsular Malaysia: Identification of their transport pathway using molecular marker approach	BAB	08-02-04-0745-EA001	RM103,680
330.	Science and Environmental Studies	Mohd. Puad Abdullah	Cloning of plant resistance gene family and fungal AVR genes	BAB	09-02-04-0756-EA001	RM180,680
331.	Science and Environmental Studies	Mohd. Puad Abdullah	Enhancement of photosynthetic activity in rice using biochemical techniques and somaclonal variation	BAB	01-02-04-0074 EA001	RM154,000
332.	Science and Environmental Studies	Mohd. Yunus Abd. Shukor	Screening of microbes with the ability to degrade acrylamide	BAB	09-02-04-0758-EA001	RM181,000
333.	Science and Environmental Studies	Mohd. Yunus Abd. Shukor	Enzymatic Methods for the Determination of Heavy Metals in the Environment	MEE	09-02-04-0854-EA001	RM160,000
334.	Science and Environmental Studies	Mohd. Yusof Sulaiman	Realization of sensor-less brushless dc motor for application in renewable energy industry	SAE	02-02-04-0134 EA001	RM197,302
335.	Science and Environmental Studies	Mohd. Zaizi Desa	Study of dye-sensitized photo electrochemical solar cell	SAE	09-02-04-0324 EA001	RM194,000
336.	Science and Environmental Studies	Mohd. Zobir Bin Hussein	The Chemistry Of New Organic-Inorganic Hybrid Materials	SAE	09-02-04-0500 EA001	RM190,000
337.	Science and Environmental Studies	Muhajir Hamid	Study of insulin secretion by antidiabetic agent of Malaysian traditional plants	HAS	09-02-04-0328 EA001	RM192,000
338.	Science and Environmental Studies	Muhamad Awang	Effects of acid deposition on nutrient availability of natural tropical forest system	MEE	08-02-04-0248 EA001	RM139,500
339.	Science and Environmental Studies	Muskhazli Mustafa	Purification and characterization of non-volatile antifungal compound produced by bacillus subtilis	BAB	09-02-04-0667-EA001	RM147,884
340.	Science and Environmental Studies	Noor Akma Ibrahim	Data mining for economic evaluation of air pollution impacts and controls	EAM	05-02-04-0422 EA001	RM182,180
341.	Science and Environmental Studies	Nor Aripin Shamaan	Purification of glutathione S-transferases in the Kedah-Kelantan cattle (Bos indicus) and the water buffalo (Bos bubalus bubalis)	BAB	09-02-04-0330 EA001	RM97,000

to be continued...

[1] Data presented IRPA RM-8 (as at Cycle 1, 2004); Total 416 EAR Grants, sorted by PTJ & Name.

†The description of the some of the above Inventions and Innovative research products available for commercialisation at UPM are contained in the books — "**R&D at UPM**: *Creating New Frontiers of Innovative Research*", First Edition, and "**R&D at UPM**: *Research Snapshots*", First Edition, ISSN. 1675-1248, Editors: Nayan Deep S. Kanwal, Mohd. Shahwahid Hj. Othman and Sidek Hj. Abd. Aziz, Published by Research Management Centre (RMC), UPM, available from Publications Unit, Administration Building, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor Darul Ehsan, Malaysia, Tel: +603 8946 6028 / 8946 6192, Fax: +603 8942 6539, e-mail: rschinfo@admin.upm.edu.my

Synthesis

BackIssues

DECEMBER 2004 — *Issue 7, 4th Quarter*

Editorial: UPM's Academic Reputation
Spotlight: Innovate or be left behind— Global aspirations and pursuits
Research Highlight: In the Making: UPM showcases its vision of success

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- Chitosan base post harvest treatments for extending Storage life of Papaya and cut Chrysanthemum
- Turning Biological Diversity into Invaluable Economic Resource
- Xenoassay-metal™, a heavy metal bioassay system
- Tree Crop Seedling Transplanter Ver-I
- A portable fiber optic Based Lightning Detection system
- Haruan Biomedical Products for Skin Diseases
- Fiber Optic Duplexer Module (FDM)

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- e-Sprint Training
- Excellent Scientist Award
- The British Inventions Show, U.K., and Ideas-Inventions-New Products International Exhibition, Germany
- R&D Commercialization Luncheon
- Newsmakers—building rapport

MARCH 2005 — *Issue 8, 1st Quarter*

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Spotlight: Nanotechnology in Sharp Focus
Research Highlight: Heading Forward Towards Excellence

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- The Role of Metabolic Enzymes in the Development of Resistance in Cocoa Mind, *Helopeltis Theivora* Waterhouse
- Natural Spray Dried Pandan (Pandanus amaryllifolius) Powder: Production and Product Development
- Cost-efficient Production of the Shitake Mushroom on Sawdust Waste
- Development of Ultrasonic and Microwave Techniques for Detection of Decay in Wooden Cross-Arms
- Fight against cancer cure - Tapioca
- Ergonomic Design of Vehicles Using Natural Gas
- Putra Blok – Interlocking Load-bearing Hollow Block
- Microbial Bioconversion of Domestic Wastewater Treatment Plant (DWTP)
- Replication of NDV in Breast cancer cell lines

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- Invention, Research and Innovation 2005
- National Intellectual Property Day 2005
- ISO Template Workshop & Lecturer's Month
- Malaysia Toray Science Foundation Award (MTSF)
- Vice-Chancellor's Visit to Poland
- Down the Memory Lane—Newsmakers around the Campus

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Spotlight: The future of Agriculture...
Research Highlight: Revitalising the Agriculture Sector – UPM's Proactive Role

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- JESKYL – A genetically-improved vaccine to contain pseudorabies disease
- IBDReal check
- Chirazim™ – a highly enantioselective enzyme
- Bile Salt Hydrolase (BSH) from Probiotic *Bifidobacterium longum* for Hypercholesterolemia
- Pullulanase Type II from a Locally Isolated Bacterium, Bacillus spp H1.5
- UPM Radiowave Planner and Predictor (RPP): A GIS Based Cell Phone Signal Strength Predictor
- PARI-Z – Underwater Unmanned Vehicle for Maritime Intelligent/Surveillance
- Banana Fibers as By Product of Agro Waste: Raw Source of Material for Textile and Handicrafts

Feature
The.. Sweet..Sweet... Herb of the decade! Stevia rebaudiana (madhu patra).....

Research Happenings
- Visit of Hon'ble Minister of Plantation Industries & Commodities
- I-TEX 2005
- PRPI 2005
- NATPRO 2005
- International Exhibition of Inventions, New Techniques & Products, Geneva, Switzerland

SEPTEMBER 2005 — *Issue 10, 3rd Quarter*

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Spotlight: Biotechnology at UPM: Curent Ssatus & Future Directions
Research Highlight: Inspiration from a Nobel Laureate- father of the idea of optimal currency area

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- BiOX™ - a New Material for Industry
- A Novel Method [HC MadeEZ] to Determine Hydrocarbon Pollution from Landfill Leachates
- RIFEILD: River Flow Estimator For Impact of Land Development
- The Super Secured Messaging System 500 (SSMS 500)
- TrichoGreen™, the biocontrol agent and growth enhancer for the oil palm industry

Feature
- Visual Impact of Agroforestry Management with Landscape Design Software

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- Biotechnology Asia 2005
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- MS ISO 9001:2000 Workshop
- Down the Memory Lane—Newsmakers around the Campus sit to Poland

DECEMBER 2005 — *Issue 11, 4th Quarter*

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Research Highlight: A Premier Research University- Future Directions

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- Double Antibody Sandwhich Enzyme Linked Immunosorbent Assay Kit for Infectious Bursal Disease
- Natural Food Colourant from Petals
- Process and Production of Novel All Natural Sunscreen Agents
- Amplifluor Universal GMO Detection System
- The Novel Feed Additives Produced by Beneficial Lactic Acid Bacteria
- AssessUrBook™

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- Unmanned Aerial Vehicle (UAV) Projects in University Putra Malaysia

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